ABSTRACT OF THE DISCLOSURE

A system and method for monitoring an apparatus or process asset including creating a process model comprised of a plurality of process submodels each correlative to at least one training data subset partitioned from an unpartitioned training data set and each having an operating mode associated thereto; acquiring a set of observed signal data values from the asset; determining an operating mode of the asset for the set of observed signal data values; selecting a process submodel from the process model as a function of the determined operating mode of the asset; calculating a set of estimated signal data values from the selected process submodel for the determined operating mode; and determining asset status as a function of the calculated set of estimated signal data values for providing asset surveillance and/or control.